

CLAIMS

What is claimed is:

- 5 1. A fuel pump nozzle drip prevention method comprising the steps of:
- adapting a fuel conduit of a fuel pump nozzle:
 - to create an adapted fuel conduit; and
 - to establish a fuel drip prevention valve element within said adapted
10 fuel conduit at a position downflow of a main valve element and
 towards a fuel source distal, terminal end of said adapted fuel conduit,
 - wherein said fuel drip prevention valve element is responsive to a fuel delivery
 shut-off condition and reconfigures upon fuel delivery shut-off of said main
15 valve element so as to substantially obstruct said adapted fuel conduit
 substantially upon said fuel delivery shutoff of said main valve element,
 thereby substantially preventing fuel drips from said fuel source distal,
 terminal end of said adapted fuel conduit substantially upon said fuel delivery
 shutoff of said main valve element,
20 wherein said adapted fuel conduit has an inner surface that defines a simple
 closed curve and a conduit axis, and
 - wherein said fuel drip prevention valve element comprises a first fuel
25 obstruction element that is rotatable about and attached at a first chord of said
 simple closed curve.
- 30 2. A fuel pump nozzle drip prevention method as described in claim 1 wherein said fuel
 is selected from the group consisting of: gasoline, diesel, jet fuel and kerosene.

3. A fuel pump nozzle drip prevention method as described in claim 1 wherein said fuel drip prevention valve element comprises a one way valve.
4. A fuel pump nozzle drip prevention method as described in claim 1 or 3 wherein said fuel drip prevention valve element comprises a dual flapper valve.
5. A fuel pump nozzle drip prevention method as described in claim 4 wherein said step of establishing a fuel drip prevention valve element within said adapted fuel conduit comprises the step of biasing said fuel drip prevention valve element in an upflow direction.
6. A fuel pump nozzle drip prevention method as described in claim 1 wherein said fuel delivery shut-off condition is a fuel delivery shut-off pressure.
7. A fuel pump nozzle drip prevention method as described in claim 1 wherein towards a fuel source distal, terminal end of said adapted fuel conduit comprises substantially at said terminal end.
8. A fuel pump nozzle drip prevention method as described in claim 1 wherein said fuel drip prevention valve element further comprises a second fuel obstruction element that is rotatable about and attached at a second chord of said simple closed curve.
9. A fuel pump nozzle drip prevention method as described in claim 8 wherein said first chord and said second chord are each contained within a plane that is orthogonal to said conduit axis..
10. A fuel pump nozzle drip prevention method as described in claim 9 wherein said first chord and said second chord are substantially collinear.
11. A fuel pump nozzle drip prevention method as described in claim 10 wherein said first chord and said second chord bisect said simple closed curve.

12. A fuel pump nozzle created by practicing the method of any of claims 1, 8, 9 or 11.
13. A fuel pump nozzle drip prevention method as described in claim 1 wherein said step
5 of adapting a fuel conduit of a fuel pump nozzle to create an adapted fuel conduit and
to establish a fuel drip prevention valve element within said adapted fuel conduit c the
step of attaching a fuel conduit extension via an attachment operation selected from
the group consisting of screw threading, adhesive attaching, and bolting.
- 10 14. A fuel pump nozzle drip prevention method as described in claim 1 wherein said step
of adapting a fuel conduit of a fuel pump nozzle to create an adapted fuel conduit and
to establish a fuel drip prevention valve element within said adapted fuel conduit c the
step of factory securing a fuel drip prevention valve element within said fuel conduit.
- 15 15. A fuel pump nozzle drip prevention method comprising the steps of:
- establishing a fuel source distal, terminal end of a fuel conduit of a fuel pump
nozzle in a fuel delivery receptacle;
- 20 wherein said fuel conduit has an inner surface that defines a simple closed
curve and a conduit axis,
- operating a main fuel flow valve element to initiate delivery of fuel through
said fuel conduit;
 - 25 - reconfiguring a fuel drip prevention valve element that comprises at least a
first fuel obstruction element from a fuel conduit obstruction configuration to a
fuel conduit flow configuration;
 - flowing fuel from a fuel source through said fuel conduit and into said fuel
delivery receptacle;

- operating said main fuel flow valve element to substantially terminate said step of flowing fuel from a fuel source through said fuel conduit and into said fuel delivery receptacle;
- reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration; and
- substantially preventing fuel drips from said fuel source distal, terminal end of said fuel conduit by performing said step of reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration,

wherein said step of reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration comprises the step of rotating said first fuel obstruction element about a first chord of said simple closed curve, and

wherein said first fuel obstruction element is attached at said first chord.

16. A fuel pump nozzle drip prevention method as described in claim 15 wherein said fuel delivery receptacle comprises an element selected from group consisting of: motorized vehicle fuel tank and airplane fuel tank.

17. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step of operating a main fuel flow valve element to initiate delivery of fuel comprises the step of squeezing a fuel pump nozzle trigger.

18. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step of reconfiguring a fuel drip prevention valve element from a fuel conduit obstruction configuration to a fuel conduit flow configuration comprises the step of reconfiguring said fuel drip prevention valve element against a bias force.

19. A fuel pump nozzle drip prevention method as described in claim 18 wherein said step of reconfiguring said fuel drip prevention valve element against a bias force

comprises the step of folding said fuel drip prevention valve element substantially in half.

20. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step
5 of operating said main fuel flow valve element to substantially terminate said step of
flowing fuel from a fuel source through said fuel conduit and into said fuel delivery
receptacle comprises the step of releasing a trigger of said fuel pump nozzle.
21. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step
10 of reconfiguring said fuel drip prevention valve element from said fuel conduit flow
configuration to said fuel conduit obstruction configuration comprises the step of
reconfiguring said fuel drip prevention valve element from a substantially nonplanar
configuration to a substantially planar configuration.
- 15 22. A fuel pump nozzle drip prevention method as described in claim 15 wherein said fuel
comprises a fuel selected from the group consisting of: gasoline, diesel fuel, jet fuel
and kerosene.
23. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step
20 of reconfiguring a fuel drip prevention valve element from a fuel conduit obstruction
configuration to a fuel conduit flow configuration occurs substantially while
performing said step of operating said main valve flow element to initiate delivery of
fuel through said fuel conduit.
- 25 24. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step
of reconfiguring said fuel drip prevention valve element from said fuel conduit flow
configuration to said fuel conduit obstruction configuration occurs substantially while
performing said step of operating said main valve flow element to substantially
terminate said step of flowing fuel.
- 30 25. A fuel pump nozzle drip prevention method as described in claim 15 wherein said step

of reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration further comprises the step of rotating a second fuel obstruction element about a second chord of said simple closed curve.

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26 A fuel pump nozzle drip prevention method as described in claim 25 wherein said first chord and said second chord are each contained within a plane that is orthogonal to said conduit axis

10 27 A fuel pump nozzle drip prevention method as described in claim 26 wherein said first chord and said second chord are substantially collinear.

28. A fuel pump nozzle drip prevention method as described in claim 27 wherein said first chord and said second chord bisect said simple closed curve

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29. A fuel pump nozzle drip prevention method as described in claim 15 wherein said fuel drip prevention valve element comprises a dual flapper valve.

30. The fuel pump nozzle used in the method of any of claims 15, 25, 27 or 29.

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31. A fuel delivery nozzle drip prevention method comprising the steps of:

- adapting a fuel conduit of a fuel delivery nozzle of a fuel container:

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(a) to create an adapted fuel conduit; and

(b) to establish a fuel drip prevention valve element within said adapted fuel conduit at a position towards a fuel source distal, terminal end of said adapted fuel conduit;

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wherein said fuel drip prevention valve element is reconfigurably responsive to:

- (a) a fuel delivery condition achieved upon reorientation of a fuel source container from a fuel delivery termination orientation to a fuel delivery orientation so as to allow fuel flow, and

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- (b) a fuel delivery termination condition so as to substantially obstruct said adapted fuel conduit upon reorientation of said fuel source container from said fuel delivery orientation to said fuel delivery termination orientation, thereby substantially preventing fuel drips from said fuel source distal, terminal end of said adapted fuel conduit upon said reorientation of said fuel source container to said fuel delivery termination orientation, and

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wherein said adapted fuel conduit has an inner surface that defines a simple closed curve and a conduit axis, and

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wherein said fuel drip prevention valve element comprises a first flow obstruction element that is rotatable about and attached at a first chord of said simple closed curve.

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32. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel is selected from the group consisting of: gasoline, diesel, jet fuel and kerosene.

33. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel drip prevention valve element comprises a one way valve.

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34. A fuel delivery nozzle drip prevention method as described in claim 31 or 33 wherein said fuel drip prevention valve element comprises a dual flapper valve.

30 35. A fuel delivery nozzle drip prevention method as described in claim 34 wherein said step of adapting a fuel conduit of a fuel delivery nozzle of a fuel container to create an

adapted fuel conduit; and to establish a fuel drip prevention valve element within said adapted fuel conduit comprises the step of biasing said fuel drip prevention valve element in an upflow direction.

- 5 36. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel delivery condition is a fuel delivery pressure.
37. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel delivery termination condition is a fuel delivery termination pressure.
- 10 38. A fuel delivery nozzle drip prevention method as described in claim 31 wherein towards a fuel source distal, terminal end of said adapted fuel conduit comprises substantially at a terminal end of said adapted fuel conduit.
- 15 39. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel delivery orientation is a fuel container tilt orientation that results in fuel flow out of said fuel source distal, terminal end of said adapted fuel conduit.
- 20 40. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel delivery termination orientation is a fuel container tilt orientation that results in substantial termination of fuel flow out of said fuel source distal, terminal end of said adapted fuel conduit.
- 25 41. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said fuel drip prevention valve element further comprises a second fuel obstruction element that is rotatable about and attached at a second chord of said simple closed curve.
- 30 42. A fuel delivery nozzle drip prevention method as described in claim 41 wherein said first chord and said second chord are each contained within a plane that is orthogonal to said conduit axis.

- 43 A fuel delivery nozzle drip prevention method as described in claim 42 wherein said
first chord and said second chord are substantially collinear.
44. A fuel delivery nozzle drip prevention method as described in claim 43 wherein said
5 first chord and said second chord bisect said simple closed curve.
45. The fuel container nozzle created by practicing the method of any of claims 31, 41 or
44.
- 10 46. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said
step of adapting a fuel conduit of a fuel delivery nozzle of a fuel container to create an
adapted fuel conduit and to establish a fuel drip prevention valve element within said
adapted fuel conduit c the step of attaching a fuel conduit extension via an attachment
operation selected from the group consisting of screw threading, adhesive attaching,
15 and bolting.
47. A fuel delivery nozzle drip prevention method as described in claim 31 wherein said
step of w adapting a fuel conduit of a fuel delivery nozzle of a fuel container to create
an adapted fuel conduit and to establish a fuel drip prevention valve element within
20 said adapted fuel conduit c the step of factory securing a fuel drip prevention valve
element within said fuel conduit.
48. A fuel delivery nozzle drip prevention method comprising the steps of:
- 25 - establishing a fuel source distal, terminal end of a fuel conduit of a fuel
delivery nozzle of a fuel container in a fuel delivery receptacle;
- wherein said fuel conduit has an inner surface that defines a simple closed curve and
a conduit axis,
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- reorienting said fuel container from a fuel delivery termination orientation to a fuel delivery orientation to initiate delivery of fuel through at least a portion of said fuel conduit;
- 5 - reconfiguring a fuel drip prevention valve element that comprises at least a first fuel obstruction element from a fuel conduit obstruction configuration to a fuel conduit flow configuration;
- flowing fuel from a fuel source through said fuel source distal, terminal end of said fuel conduit and into said fuel delivery receptacle;
- 10 - reorienting said fuel container from said fuel delivery orientation to said fuel delivery termination orientation so as to substantially terminate said step of flowing fuel from a fuel source through said fuel source distal, terminal end of said conduit and into said fuel delivery receptacle;
- reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration;
- 15 - substantially preventing fuel drips from said fuel source distal, terminal end of said fuel conduit,

wherein said step of reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration
20 comprises the step of rotating said first fuel obstruction element about a first chord of said simple closed curve, and

wherein said first fuel obstruction element is attached at said first chord.

25 49. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said fuel delivery receptacle comprises an element selected from group consisting of: motorized vehicle fuel tank, airplane fuel tank, motorized farm equipment fuel tank, and motorized lawn equipment fuel tank.

30 50. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reorienting said fuel container from a fuel delivery termination orientation to a

fuel delivery orientation to initiate delivery of fuel through at least a portion of said fuel conduit comprises the step of tilting said fuel container forwards sufficiently to cause fuel flow through said at least a portion of said fuel conduit.

- 5 51. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reconfiguring a fuel drip prevention valve element from a fuel conduit obstruction configuration to a fuel conduit flow configuration comprises the step of reconfiguring said fuel drip prevention valve element against a bias force.
- 10 52. A fuel delivery nozzle drip prevention method as described in claim 51 wherein said step of reconfiguring said fuel drip prevention valve element against a bias force comprises the step of folding said fuel drip prevention valve element substantially in half.
- 15 53. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reorienting said fuel container from a fuel delivery orientation to said fuel delivery termination orientation so as to substantially terminate said step of flowing fuel from a fuel source through said fuel source distal, terminal end of said fuel conduit and into said fuel delivery receptacle comprises the step of tilting said fuel
20 container backwards sufficiently to terminate fuel flow through said fuel source distal, terminal end of said fuel conduit.
54. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reconfiguring said fuel drip prevention valve element from said fuel conduit
25 flow configuration to said fuel conduit obstruction configuration comprises the step of reconfiguring said fuel drip prevention valve element from a substantially folded position to a substantially planar position.
55. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said
30 fuel is selected from the group consisting of: gasoline, diesel fuel, jet fuel, and kerosene.

56. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reconfiguring a fuel drip prevention valve element from a fuel conduit obstruction configuration to a fuel conduit flow configuration occurs substantially
5 after performing said step of reorienting said fuel container to a fuel delivery orientation to initiate delivery of fuel through at least a portion of said fuel conduit.
57. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of substantially preventing fuel drips from said fuel source distal, terminal end of
10 said fuel conduit is initiated upon performing said step of reconfiguring said fuel drip prevention valve element from said fuel conduit flow configuration to said fuel conduit obstruction configuration.
58. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reconfiguring said fuel drip prevention valve element from said fuel conduit
15 flow configuration to said fuel conduit obstruction configuration occurs upon performing said step of reorienting said fuel container from said fuel delivery orientation to said fuel delivery termination orientation so as to substantially terminate said step of flowing fuel from a fuel source through said fuel source distal, terminal
20 end of said conduit and into said fuel delivery receptacle.
59. A fuel delivery nozzle drip prevention method as described in claim 48 wherein said step of reconfiguring said fuel drip prevention valve element from said fuel conduit
25 flow configuration to said fuel conduit obstruction configuration further comprises the step of rotating a second fuel obstruction element about a second chord of said simple closed curve
60. A fuel pump nozzle drip prevention method as described in claim 59 wherein said first
30 chord and said second chord are each contained within a plane that is orthogonal to said conduit axis.

61. A fuel pump nozzle drip prevention method as described in claim 60 wherein said first chord and said second chord are substantially collinear.
62. A fuel pump nozzle drip prevention method as described in claim 61 wherein said first chord and said second chord bisect said simple closed curve.
63. A fuel pump nozzle drip prevention method as described in claim 48 wherein said fuel drip prevention valve element comprises a dual flapper valve.
64. The fuel container, nozzle and valve element of any of claims 48 or 59.